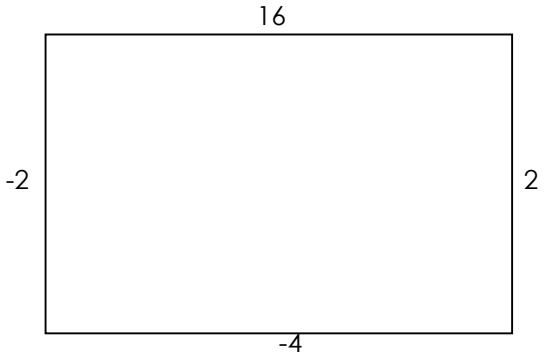
Power Functions Name: _____

1) Explain the difference between a monomial, a binomial, a trinomial and a polynomial and give an example of each.

2) For each of the following monomials, identify the coefficient and the degree:
   a. $11x^3$ b. $-4x$ c. 8

Set the window on your calculator for problems 6 – 8 to: xmin → –2, xmax → 2, ymin → - 4, ymax → 16. Graph all three of the functions on the same graph.



3) Graph $y = x^4$. Sketch and label the function.

4) Graph $y = x^8$. Sketch and label the function.

5) Graph $y = x^{12}$. Sketch and label the function.

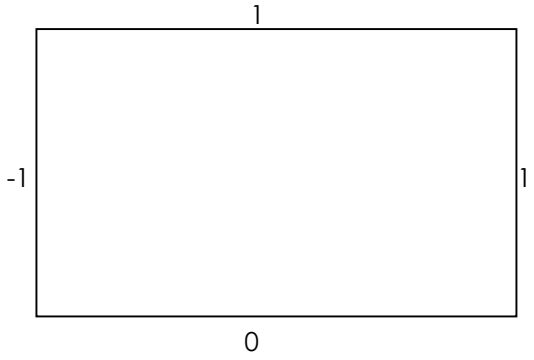
These functions are even power functions.

Using the graphs above, answer questions 9 – 10.

6) What do you notice about the domain and range of an EVEN POWER FUNCTION?

7) What do you notice about the symmetry of an EVEN POWER FUNCTION?

Graph the same three power functions above in a new window: xmin → -1, xmax → 1, ymin → 0, ymax → 1

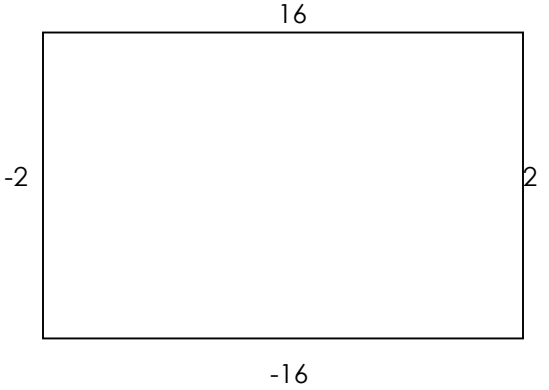


8) What happens to the graph of an EVEN POWER FUNCTION when the magnitude increases? (What happens when the exponent gets bigger?)

9) Where do the functions intersect?

10) Will $y = x^{14}$ intersect at the same points? Why or why not?

Change the window on your calculator for problems 14 - 16 to:
xmin → –2, xmax → 2, ymin → -16, ymax → 16. Graph all three of the functions on the same graph.



11) Graph $y = x^3$. Sketch and label the function.

12) Graph $y = x^7$. Sketch and label the function.

13) Graph $y = x^{11}$. Sketch and label the function.

These functions are odd power functions.

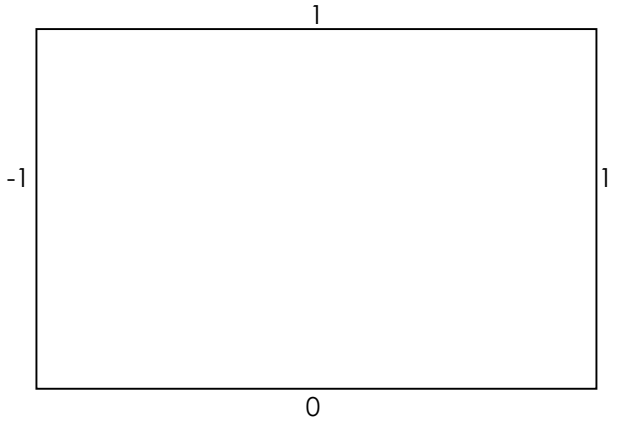
Using the graphs of the odd power functions, answer questions 17 – 18.

14) What do you notice about the domain and range of an ODD POWER FUNCTION?

15) What do you notice about the symmetry of an ODD POWER FUNCTION?

Graph the same three power functions above in a new window: xmin → -1, xmax → 1, ymin → -1, ymax → 1

16) What happens to the graph of an ODD POWER FUNCTION when the magnitude increases? (What happens when the exponent gets bigger?)



17) Where do the functions intersect?

18) Will $y = x^{15}$ intersect at the same points? Why or why not?

In many applications, the relation that exists between two variables x and y follows a function of the form:

$$y = ax^b,$$

where a and b are real numbers > 0. This is called the ***GENERALIZED POWER FUNCTION.***

19) Graph 5 functions of the form $y = ax^b$, where $a > 0$, $b > 1$, $x > 0$ and $y > 0$. Use the window [0, 5, 1, 0, 5, 1]. What pattern can you find in the graphs of all of these functions? Sketch a generalization.

20) Graph 5 functions of the form $y = ax^b$, where $a > 0$, $x > 0$, $y > 0$, $0 < b < 1$. Use the window [0, 5, 1, 0, 5, 1]. What pattern can you find in the graphs of all of these functions? Sketch a generalization.

You can use your calculator to find a Power Regression equation the same way you used it to find a Linear Regression equation. For example: A period of a pendulum is the time required for one oscillation. An experiment is conducted in which pendulums are created with different lengths, l, and the corresponding periods are recorded. Enter the data in the table below in your calculator to create a scatter plot:

Length l (in feet)	1	2	3	4	5	6	7
Period T (in seconds)	1.10	1.55	1.89	2.24	2.51	2.76	2.91

21) Use the power regression feature on your calculator to find a power regression equation that models the data.

22) What does the "r" tell you about your graph?

23) If the pendulum has a length of 2.3 feet, what is the period of the pendulum?